

of species so few details that in its present form it is of little value. This may be the fault of the subject rather than of the authors, but had an attempt been made to give a key-index to the species and their recognition, this would have been of much use. With these reservations, the authors are to be congratulated on having produced a work which must for some time to come remain the standard one on the subject.

The tubercle and acid-fast bacilli met with in milk and the biology of the tubercle bacillus are fully and adequately treated, and a number of coloured and other illustrations of cultures and colonies are given which will be of the greatest service to those who are unable to consult original papers. As regards the relation of bovine and human tuberculosis, a judicial and judicious summary is given, and the authors express the provisional opinion "that tuberculosis in all animals is generally one and the same disease, but that it differs in various ways in different animals and according to the strain and virulence of the infecting bacillus. That human tuberculosis can be transmitted in certain circumstances to animals we do not doubt. There is also *prima facie* evidence to show that the reverse proposition is true, namely, that under certain conditions bovine tuberculosis is transmissible to man. We therefore look upon the two diseases as different species or varieties of one and the same generic disease and intercommunicable. Whilst we hold this view in respect to the communicability of tubercle, we do not for one moment suppose that its transmission through milk is very frequent or very widespread. The great field of infection in tuberculosis is from animal to animal, and from man to man, and cross-infection is probably less common than is generally supposed."

This opinion practically coincides with that expressed in the recent report of the Royal Commission on Tuberculosis. Dealing with outbreaks of epidemic disease due to an infected milk supply, scarlatina, enteric fever, diphtheria, epidemic diarrhoea, cholera, &c., receive attention, and the details of many of the principal outbreaks are summarised. As regards the celebrated Hendon outbreak of scarlatina, the whole of the facts is stated, and not a portion only, as is generally the case, and the authors conclude, "we are of opinion that the exact origin of the London epidemic at that time has not yet been, and now probably never will be, demonstrated." It is to be hoped that future writers on the subject will note this.

The last portion of the book deals with the control of the milk supply (*a*) by the State, and (*b*) by private enterprise, with useful appendices on legal enactments and model regulations for dairies, &c. The summary on milk legislation in the various countries of the world is especially to be commended. Tuberculin is touched upon, and the old and the new tuberculins are described, but no mention is made that it is the *old* tuberculin which is employed for cattle testing. The sections dealing with pasteurised and sterilised milk are very brief, and might well be expanded in a future edition, while condensed milks seem to be unnoticed. The book is well produced and illustrated, but the index might with advantage be fuller.

R. T. HEWLETT.

OUR BOOKSHELF.

Handbook to the Natural History of Cambridgeshire.
Edited by J. E. Marr and A. E. Shipley. Pp. viii + 260: (Cambridge: University Press, 1904.) Price 4s. net.

THE little volume before us affords an excellent example of the thorough-going and careful manner in which every detail connected with the late meeting of the British Association at Cambridge was thought out and worked out by the responsible executive. As a matter of fact, the volume in question is likely to be much more than a mere ephemeral production, and will probably take its place as one of the standard text-books in the scientific teaching of the university; for it will scarcely be disputed that a thorough knowledge of the natural history of the district in which the student resides is one of the very best aids towards attaining a comprehensive grasp of biology and geology in general. The term natural history, it should be mentioned, is employed in this work in its very widest and most extensive sense, embracing not only zoology and botany, but likewise geology and palæontology; while the scope of the undertaking is still further increased by an excellent chapter on prehistoric archaeology.

For the planning and supervision of a work of this nature no better editors could possibly have been found than Messrs. Marr and Shipley, the one gentleman being an eminent authority on geology in general, and that of the district in particular, while the other is no less distinguished as a biologist. Dr. Marr, in collaboration with Mr. Fearnside, has contributed the introductory chapter on physiography, but Mr. Shipley has contented himself with purely editorial functions. For the other chapters of the work the editors have been fortunate in securing the (gratuitous) services of a number of specialists, at least two of whom happened to be engaged on the natural history of Cambridgeshire for the "Victoria County History," and were permitted by the council of that undertaking to make use of their labours for the benefit of the volume before us. Hitherto no complete lists of the fauna of Cambridgeshire appear to have been published, and Mr. H. H. Evans's account of the birds of the county may be cited as an excellent example of the manner in which such local faunas should be described. It was somewhat unfortunate that in the account of the vertebrate palæontology of the county the introduction of a personal element was unavoidable; but the proposal contained therein, to name a species after the well known palæontologist whose work is criticised, may be taken as an indication of the absence of any trace of ill-feeling on the part of the writer.

Both editors and authors are to be congratulated on the production of such an excellent and comprehensive local "natural history" in such a small compass, the permanent value of the work being largely increased by the beautifully coloured geological map of the county.

R. L.

Theorie der Elektrizität und des Magnetismus. By Dr. I. Classen. Band i. Electrostatik und Electromagnetismus. Pp. x + 184. (Leipzig: G. J. Göschen, 1903.)

THE conventional text-book of electricity starts with the supposition that the forces exhibited by electrified bodies can be attributed to a something called electricity which resides on material bodies. Quantitative laws are developed, and we are led up to the Faraday-Maxwell conception of the medium as the real seat of electrical action.

Prof. Classen, like many others, finds this method unsatisfactory. The first view presented is too narrow; its arbitrary character cannot always be realised, the

development is often hap-hazard, and the mental revolution required before Faraday's idea can be assimilated generally proves troublesome to the student.

The author's view, then, so far as we can gather, is that the subject should be developed from Faraday's standpoint. With this we are in complete sympathy. But the problem of writing a text-book from a new order of thought is no easy matter, and the first portion of the volume is distinctly disappointing. There are frequent relapses to the old method, the treatment is somewhat laboured, and the result, so far from being inspiring, is confusing and inconclusive.

In the latter part of the volume the author treats of electrical currents, and the fundamental laws are developed without the introduction of the magnetic properties. This is distinctly good, and, although not quite new, will commend itself favourably to those who take an interest in the philosophical and logical presentation of the subject.

We cannot help thinking that the author is somewhat misguided in pushing a hydrodynamical analogue to the extent he does. It is difficult to reconcile the suppositions that velocity corresponds to electrical force, and pressure to electrical potential. Chapter x. is devoted to "an extension of this hydrodynamical picture." We are of opinion that when an analogy becomes so troublesome that a chapter is required to expound its additional artificial properties, it has ceased to be of any assistance, and the sooner it is dropped the better.

Die Keimpflanzen der Gesneriaceen. By Dr. Karl Fritsch. Pp. iv+188. (Jena: G. Fischer, 1904.) Price 4.50 marks.

THE Gesneriaceæ are generally familiar to horticulturists and others, since the order includes several favourite greenhouse plants, to mention only *Ramondia*, *Saintpaulia*, *Achimenes*, *Streptocarpus*, and *Sinningia*, of which one species passes as *Gloxinia*. The morphological peculiarities of these and other less known genera are not so familiar, in fact, it has been the object of Dr. Fritsch to find their correct interpretation by the aid of cultivation and examination of such seedlings as he was able to obtain. Some of the principal morphological features are the tuber-bearing plants of which *Sinningia* is a type; vegetative scale-covered runners which propagate the plant, characteristic of *Achimenes* and *Kohleria* (*Isoloma*); and the unequal development of cotyledons which is well known to cultivators of *Streptocarpus Wendlandi*. The unequal development of the cotyledons is regarded by the writer as a special case of *anisophylly*, for which he proposes the term *anisocotily*; in this connection there is a discussion of the views put forward by Wiesner and Goebel on *anisophylly*, and it is shown that some modification is required in order to explain *anisocotily*. A further irregularity in the case of *Klugia Zeylanica* and some species of *Streptocarpus* is the displacement of the cotyledons from the opposite to an alternate position; this is attributed to the intercalary development of an internode between the cotyledons, to which the name of *mesocotyl* is given.

The scale-bearing runners have been variously described; they resemble bulbs in so far as the leaves are swollen into food reservoirs, but they differ therefrom because the stem is elongated and also contains reserve food material, and the swollen leaves may be closely packed, when the runner resembles a pine cone, or the leaves may be loosely arranged; on this account Dr. Fritsch prefers to call them *bulbshoots* (*Zwiebelsprosse*), and he would include under this designation the similar bodies which are found on species of *Epilobium*, *Oxalis*, *Saxifraga*, and *Dicentra*.

Dr. Fritsch confirms Lubbock's statement that the

tubers of *Corytholoma* (*Gesneria* of gardeners) and *Sinningia speciosa* (*Gloxinia*) are produced by the thickening of the hypocotyl, and adds that in the case of *Corytholoma cardinalis* the epicotyl also takes part in its formation. It is not possible to mention, much less to pass in review, the various morphological details, but enough has been said to show that the Gesneriaceæ, as an order, will repay careful study, and it should be added that this account of the seedlings is characterised by clearness and breadth of treatment, and the German is simple enough to suit the veriest tyro.

Das Leben im Weltall. By Dr. L. Zehnder. Pp. 125. (Leipzig: J. C. B. Mohr, 1904.) Price 2.50 marks.

MAN and animals and plants all live, each in its degree. Lower than these is matter itself. Does it live? Do crystals live in their mother-liquid? In general, is the universe itself a living thing? These are the questions which a professor of physics of Munich attempts to answer in this small volume. We learn that the variations of matter, and those variations of plants and animals which are taken as special evidence of their vitality, are linked together in an unbroken chain. On the other hand, an exception is made in respect to the ultimate structure of the atom itself. In fact, a well defined boundary is found to separate substances of which inorganic bodies consist from substances which are necessary for the formation of organic bodies.

We can by no means pretend to have followed all the arguments put forward, even when they have purely physical reference. Thus, the author concludes that the æther has an atomic structure merely on the ground that, having decided that it is a substance, there is neither sense in nor justification for attributing to it any properties except those which other substances possess. This dogmatic style of reasoning is characteristic of the whole argument; and it certainly does not conduce to confidence when matters are discussed with which we are not so familiar.

First Stage Steam. By J. W. Hayward, M.Sc. Pp. 230. (London: W. B. Clive, University Tutorial Press, Ltd., 1904.) Price 2s.

MR. HAYWARD is very happy in the treatment of his subject in his "First Stage Steam," written to meet the requirements of the examination of the Board of Education at South Kensington. After a short introductory chapter on mensuration and squared paper work, drawings of a simple horizontal steam engine are given, and the functions of the various parts are described in detail. This description occupies considerable space, and at appropriate intervals is made the occasion for the introduction of experiments and calculations bearing on the subject. The Lancashire boiler with its mountings is then well described, and this leads naturally to the consideration of combustion and the heat properties of steam. The reader is introduced to these by simple and striking experiments which he can make himself, and not until after this has been done is the student informed of the results of classical experiments on which heat calculations of the steam engine are based. The writer then, by the help of good illustrations, touches on the salient points connected with the design and working of modern locomotives, marine engines, internal combustion engines, and steam turbines. The reader is left with the impression that there is very much in the subject worthy of attentive study. A special feature of the book is the encouragement given to quantitative experimental work with simple apparatus which the student can make and use himself. The book is not free from slight defects, but is sure to give satisfaction wherever used.